New Records and Descriptions of Hemiptera-Heteroptera from the Three Kings Islands.

By T. E. WOODWARD,

Department of Entomology, University of Queensland.

Abstract.

Twenty-five species of Heteroptera are now known to occur on the Three Kings. Species found also both on the mainland of New Zealand and overseas are—Pentatomidae: Cuspicona simplex Walker; Cydnidae: Philapodemus australis (Erichson); Lygaeidae: Pachybrachius nigriceps (Dallas); Reduviidae: Empicoris rubromaculatus, (Blackburn); Nabidae: Nabis capsiformis Germar; Miridae: Megaloceroea reuteriana Buch. White, Eurystylus australis Poppius, Coridromius variegatus (Montrouzier); Veliidae: Microvelia halei Esaki. Species known only from New Zealand (Maorian sub-region)—Lygaeidae: Nysins huttoni Buch. White, Rhypodes clavicornis (F.) (showing some local variation), Targarema staali Buch. White, Taphropeltus putoni (Buch. White), Cymus novaezelandiae sp. nov.; Nabidae: Nabis maoricus Walker; Miridae: Calocoris laticinctus (Walker); Sthenarus myersi Woodward. Forms not recorded outside the Three Kings—Pentatomidae: Cermatulus nasalis turbotti Woodward; Lygaeidae: Tomocoris insularis Woodward. In addition, one species of Anthocorid and one Aradid have been sent to specialists for determination, and there have been noted one apparently endemic species of Sthenarus and three species of Lygus, of which one is not known from the mainland.

Cymus novaczelandiae sp. nov. and the nymphs of Cermatulus nasalis turbotti are described. Information is given on local variation in rostral length of Rhypodes claricornis,

ACKNOWLEDGMENTS.

I am much indebted to the authorities of the Auckland Institute and Museum, and particularly Dr. G. Archey and Mr. E. G. Turbott, for the opportunity of visiting the Three Kings on one of the expeditions, and of examining much material, to Mr. Turbott for specimens of Cermatulus, to Mr. J. S. Edwards for the collection of a large series of Hemipterous material and for locality and habitat information, and to Dr. W. E. China for kindly checking some of the species against British Museum material and for the determinations acknowledged in the text. The author's expenses in participating in the 1951 expedition were defrayed from a Hutton Research Grant of the Royal Society of New Zealand.

INTRODUCTION.

The types of *Cermatulus nasalis turbotti* were collected by Mr. E. G. Turbott during the autumn, 1946, expedition of the Wild Life Branch of the Department of Internal Affairs and described by the author in

1950. The rest of the material was collected by Mr. Turbott and the author on the Auckland Museum expedition of summer, 1951, and by Mr. J. S. Edwards on the Museum's expedition of 1952-53.

While a survey so restricted in time and season cannot, of course, be regarded as all-inclusive, nevertheless collecting has been fairly intensive and carried out at probably the optimum season for insect activity. Many mainland species which were especially sought for in appropriate localities were not found in these islands. The time available for collecting on the smaller islands of the group has been extremely limited, so that our present conception of the Three Kings Heteropteran fauna is based almost entirely on that of Great Island, which has suffered the most floristic alteration in recent times (Baylis, 1948; Turbott, 1948).

The general conclusion must be that the Heteropteran fauna of the Three Kings is a restricted sample of the mainland fauna, together with a few interesting endemic species and subspecies which have apparently developed there in isolation. The total number of discovered species of Heteroptera in the group is twenty-five. Three species, Tomocoris insularis Woodward, Lygus sp., and Sthenarus sp., and one subspecies, Cermatulus nasalis turbotti Woodward, have not been recorded from the mainland or seen by the author in mainland collections, and are apparently not represented elsewhere. The first is undoubtedly a relict species of a genus once more widely distributed in New Zealand (Woodward, 1953, p. 213). In addition, the Great Island population of Rhypodes clavicornis (Fab.) shows a constant structural difference from all mainland specimens examined in the strikingly longer rostrum (p. 222), and thus might be regarded as constituting an insular subspecies or incipient subspecies. The S.W. Island population of this species is intermediate as regards this character between the Great Island and the mainland forms.

It is hoped later to present a more detailed comparison of the Hemipteran faunas of the mainland and the Three Kings when the Homoptera of the latter have been worked out.

The relative sparsity of the present bug fauna seems attributable to four main causes:

- (1) Non-representation of mainland species in the Three Kings area when this was connected to the mainland (due to restrictions of geography, small area, and less variety of plant cover).
- (2) The emergence of species and subspecies on the mainland since the separation of the Three Kings. This probably applies to many of the mainland forms with restricted distribution and of apparently recent origin, such as the brachypterous Rhyparochrominae inhabiting leafmould. The converse of this is the development of species and subspecies on the Three Kings.
- (3) The introduction of species into the mainland but not to the Three Kings, due to the relative inaccessibility and the much smaller area of the latter. Such recently introduced Pentatomids as Nezara viridula (Linn.) and Antestia orbona Kirkaldy are examples. The former, although apparently it has not yet invaded the Three Kings, has recently spread to the far northern coast of the North Island of New

Zealand. On the other hand, Cuspicona simplex Walker, which has recently been introduced into the mainland, has also found its way to at least one island of the Three Kings group.

(4) The elimination of host plants and habitat niches, firstly by Maori occupation and secondly by goats since their introduction last century until their destruction in 1946 (Baylis, 1948; Turbott, 1948). The effects would presumably have been greatest on tree and forest dwelling insects. On the other hand, survival of species frequenting kanuka (Leptospermum ericoides), at least some grasses and sedges, and the more inaccessible cliff and rock plants, has been relatively favoured. This is seen by the collection data below and accords with the effects of Maori occupancy and of goats as detailed by Baylis and Turbott. It is of interest that both on the Three Kings and on the mainland kanuka has been found by the writer to suport a much richer bug fauna than manuka (L. scoparium), and, but for the survival of the former as a dominant element of the flora, probably the Hemiptera would have been even more depleted. On the Three Kings, only three Heteropteran specimens were taken from manuka, a fifth instar nymph of the predacious Pentatomid Cermatulus nasalis turbotti, and one male and one nymph of the Lygaeid Pachybrachius nigriceps (Dallas).

It is, of course, at present difficult to distinguish the effects of (1) and (4), but additional information would no doubt be obtained by intensive collecting from South-West Island and the other smaller islands of the group, which probably support a virtually primitive plant community, though more restricted than that formerly covering Great Island (Baylis, 1948).

The positions of the quadrats and other localities noted in the following records are shown by Turbott (1948; pl. 41), Baylis (1948; p. 242), and Battey (1951).

The bulk of the material recorded is to be deposited in the Auckland Museum.

FAMILY PENTATOMIDAE. SUB-FAMILY PENTATOMINAE.

Cuspicona simplex Walker.

1867—Cuspicona simplex F. Walker, Cat. Spec. Het. Hem. Coll. Brit. Mus., pt. 2: 388.

One 2, S.W. Island, 13/1/51, sweeping a mixed growth of Solanum nigrum L. and Solanum aviculare Forst. (poroporo). After the capture of this specimen, stands of Solanum on both S.W. and Great Island were vigorously swept, but no further specimens were found. This Australian species was recorded from the mainland of New Zealand by Spiller and Turbott (1944; pp. 79-80), where it is apparently a recent introduction. Its incursion into the Three Kings is also apparently recent, and perhaps it has not yet had time to become fully established or to spread to Great Island. Spiller and Turbott record it from North Auckland (Hokianga), Auckland (widely distributed, including Waiheke Island), and Taranaki (New Plymouth). Besides Auckland itself, the writer has taken it in various parts of North Auckland (Paihia

(13/2/49) and Russell (14/2/49), Bay of Islands, and Mangamuka Gorge (17/2/51)), Little Barrier Island (11/12/50), and Wellington (Otaki R. (S. of Levin) and Point Howard (31/1/51)). All captures were on solanaceous plants.

SUB-FAMILY ASOPINAE (AMYOTINAE).

Cermatulus nasalis (Westwood) subsp. turbotti Woodward.

1950—Cermatulus turbotti Woodward, Rec. Auck. Inst. Mus. 4 (1): pp. 24-30; figs. 1-2.

1953—Cermatulus nasalis turbotti Woodward, Trans. R. Soc. N.Z. 80 (3 and 4): pp. 299, 308-310, 312, 318; figs 9, 34.

Type 9 9 collected by E. G. Turbott, Great I.: 1 9, Tasman Valley, 6/5/46; 2 9 9, near depot, 5 and 10/5/46; all on kanuka (Leptospermum ericoides A. Rich.).

On the 1951 expedition, the following specimens were collected, all from Great Island: 2 adults from near depot (1 & , 12/1/51, E. G. Turbott; 1 & , 14/1/51, T.E.W.); 4 last (fifth) instar nymphs (2 from the eastern slopes of Tasman Valley, 12/1/51; 2 from the East Point, 14 and 15/1/51, T.E.W.); 3 young nymphs from eastern slopes of Tasman Valley, 12/1/51 (1 second instar, 2 third instar, T.E.W.). All except one of the specimens were taken on kanuka (L. ericoides); one of the fifth instar nymphs from East Point was on L. scoparium Forst. (manuka).

The two last instar nymphs caught on 12/1/51 emerged in captivity, one (3) on the day of capture, while the other (2) was found to have emerged by the return to Auckland (18/1/51). The former was seen, at emergence, to be bright red, but by the next day had darkened to the normal adult coloration, the hemelytra being the last to change colour.

Adult Male

The males of this subspecies show the same tendency as the females to a greater body size than in nasalis. Length (3 & &), 12.0-12.5 mm. Width across pronotal shoulders, 6.25-6.5 mm. Head as in 9, except that apical margin of tylus is more broadly convex and disc of juga has dark ochreous mottlings. As in 9, eye only $\frac{1}{3}$ as wide as interocular space. Head above, pronotum and scutellum in all three specimens with metallic bronzy and greenish reflections. Antennal segment III $\frac{2}{3}$ - $\frac{3}{4}$ as long as II; IV 1/5th- $\frac{3}{8}$ III, and V subequal to or rather shorter than IV. Pronotum across shoulders 2.20 times median length. Membrane of hemelytra infuscated, particularly near anal angle of corium, appearing bronzy-brown in closed position; veins darker brown. Hind wings with green reflections. Black sternal spots of abdomen smaller than in 9. Other features as described for 9 (Woodward, 1950, op. cit.).

Nymphs

Fifth (last) Instar:

Ovoid, about $\frac{1}{2}$ as long again as wide across abdomen (9.5 mm.: 6 mm.). Width of head across eyes, 2.26 mm. Dorsal surface of head, pronotum, scutellum, and wing pads shining bronzy-black with metallic

green reflections, except for the eyes, which are brownish black, and a broad, orange-brown marginal band on each side of pronotum, narrowing at posterior shoulders, and along anterior half of each wing pad. Dorsal surface of abdomen with five median bands of similar metallic colour to above, the first transversely linear, very short antero-posteriorly, the second wider and several times longer, and flanked on each side by a small patch of similar colour, the third the widest and more than twice as long as second, the fourth the longest, the fifth the narrowest and nearly rectangular. Dorsum with five large lateral patches of similar metallic colour on either side, each invaded at margin by an orange-brown semicircular area. Connexivum below with similar, though smaller, dark metallic patches, the invading semicircles proportionately larger. A sixth, smaller, anterior patch on each side of dorsum may be reduced to a transverse bar. Last three (reduced) terga, including that of anal tube, completely dark metallic, except for small, lateral, orange-brown patch on each side of antepenultimate (eighth). All metallic areas rugose and, especially on thorax and wing pads, strongly punctate; spaces between them on abdomen orange-brown mottled with purplish brown, without rugae and not or scarcely punctate; an unmottled vellowish brown area inside mesial margin of each wing pad. Antennae orange-brown; first segment with external dorso-lateral aspect black: second black on apical \(\frac{1}{4}\); third and fourth black except at base. Rostrum reaching hind coxae; infuscated ochreous, last segment blackish brown. Ventral surface of body yellowish to pinkish ochreous, with dark spots and bands. Ventro-lateral regions of head and thorax shining dark metallic. Legs vellowish ochreous with reddish and black mottlings; femora at apex, tibae at base and apex, and whole of tarsi shining black. Ventral black spine of fore tibiae pronounced. Wing pads reaching half-way along third abdominal tergum (level with posterior margin of second median metallic bar). Scutellum well defined as a bluntly rounded triangle between them.

A general darkening of the pale areas may occur after death in dried specimens.

Sides of tylus parallel throughout; shape of tylus and juga as described for adult δ . Eye only 0.29 times as wide as interocular space (7.5: 26). First antennal segment very short, not reaching to apex of head; proportions of segments II-IV, 45: 23: 23. Pronotum subtrapeziform; anterior margin widely and rather shallowly concave; posterior margin nearly straight, with the backward triangular projections smaller and more rounded than in adult, base outside them slightly sinuate; sides gently sinuate, slightly concave just behind middle; median length nearly equal to length of head, and about $\frac{1}{3}$ posterior width and $\frac{3}{4}$ anterior width of pronotum (32: 34: 90: 42). Pronotum, and scutellum except at apex, with a well defined impressed median line (ecdysial cleavage line). Mesosternum on each side of low carina transversely striate, but ochreous, not metallic as in adult. Anterior abdominal spine rounded, very short, scarcely reaching anterior margin of hind trochanters.

Ecdysis: At the last ecdysis the nota of the 9 split in the median longitudinal line from the anterior margin of the pronotum through the length of the scutellum and metanotum, which is very short in the mid-line. Cleavage thus occurs along and for a short distance behind

the median line visible in the fifth instar nymph. In this respect the last ecdysis resembles that described by Myers (1926; p. 497) for Glaucias amyoti (A. White) rather than in Cermatulus nasalis nasalis as described by the same author (p. 493). However, the process is subject to a certain amount of individual variation. The last ecdysis in the latter subspecies was observed by Myers in only one specimen. In the only other instance so far observed in turbotti the two halves of the thoracic plates have closed back, one over the other, so firmly that it is impossible to delimit the ecdysial line in this region. In both specimens of turbotti a transverse split occurred along the whole dorsal width of the base of the head, in the membranous posterior border of the occipital region which in life is covered by the anterior part of the pronotum. From this, on each side, a split extended forward along the inner dorsal margin of the eve to its anterior end. Thus the entire sclerotised dorsal plate of the head between and before the eyes remained intact and was levered up from behind and pushed forward while the adult head and its appendages were being withdrawn; the rest of the body was drawn forward through the median gap in the thoracic plates.

The fifth instar nymph of *nasalis* differs from that of *turbotti* mainly in the evenly convex margins of the pronotum, which lack any concavity or sinuation, and in the absence of the marginal orange-brown areas in the dark connexival patches. Other colour differences may well be subject to individual variation in both species. For a description and illustration of the fifth instar nymph of *C. nasalis nasalis*, see Myers, 1926, pp. 491-492, fig. 12, where these differences from *turbotti* are well shown.

Third Instar:

Ovoid. Length about 4 mm. and width about 2.75 mm., but the comparative softness of the integument makes for variation in size in life and for considerable shrinkage and distortion after death. Width of head across eyes, 1.27-1.32 mm. (Head capsule width is a better criterion for differentiating instars.) Distribution of light and dark areas as for fifth instar, except in the following respects: dorsal surface of head and thorax shining black with greenish reflections, but without the pronounced metallic bronzy sheen; sides of pronotum and, more obscurely, of mesonotum, yellow-brown; lateral black areas of abdomen with the marginal orange-brown invasions less clearly defined; a pair of conspicuous yellow triangular areas, one on each side of dorsum of abdomen at its anterior end; a pair of smaller yellow spots towards posterior end of dorsum. To the naked eye, apart from these patches, the dorsum appears completely black, the median black patches forming a more or less continuous block, especially after death. Venter of abdomen reddish brown. Legs, rostrum (last segment paler), and ventral surface of head and thorax shining blackish brown; tarsi black. First and second segments of antennae blackish brown, third and fourth black, with base of third orange-brown. Dorsal black areas only very obscurely rugulose and shallowly and sparsely punctate.

Wing pads not evident. Scutellum indicated only by the obtuse backward angulation of the mesonotum, not covering the metanotum. Fore tibiae with ventral spine small and easily overlooked. Rostrum

well surpassing hind coxae. Abdominal spine, ventral thoracic carina and striate areas not developed. Thoracic cleavage line as in last instar. Pronotum proportionately much shorter than in last instar; anterior margin concave, posterior convex, the two nearly parallel; sides nearly straight; median length just over ½ length of head and about 2/7th posterior width and rather less than ½ anterior width of pronotum (12: 20: 41: 26). Eye 0.3 times as wide as interocular space (4.5: 15). Proportions of antennal segments II-IV, 23: 13: 16.

Second Instar:

Ovoid. Length about 3 mm. Width about 2.25 mm. Width of head across eyes, 1.05 mm. Colour pattern as for third instar, except that yellow-brown on margins of pronotum is less pronounced, and is absent from mesonotum; legs, rostrum, ventral surface of head and thorax, antennae except for extreme base of third segment, all black; first median black bar of abdominal dorsum scarcely apparent, second bar without the lateral spots; lateral black patches of dorsum without any signs of marginal orange-brown invasions.

Rostrum passing hind coxae. Proportions of antennal segments II-IV, 14: 9: 12. Pronotum shaped as in third instar; median length $\frac{1}{2}$ length of head and about $\frac{1}{4}$ posterior width and just over $\frac{1}{3}$ anterior width of pronotum (7.5: 15: 29: 21). Eye $\frac{1}{3}$ as wide as interocular space (3.75: 11.5).

(Proportionate measurements to the scale 18 units = 1 mm.)

The paucity of Pentatomids as represented in these collections is outstanding, and particularly the absence of the common and widely distributed mainland species *Dictyotus caenosus* (Westwood). Its habits as a frequenter of the ground and of low-growing plants may tend to restrict its dispersal, though it also occurs in Australia; it is, however, a form that could easily have been transported by the early ships. It is quite possible, of course, that there occur on the Three Kings some species of this family, particularly the less common ones, which have been missed in collecting. However, there is undoubtedly a strong element of chance as to which species happen to reach such an area, and the results of these collections tend to emphasise this.

FAMILY CYDNIDAE.

Philapodemus australis (Erichson).

1842-Cydnus australis Erichson, Arch. für Naturg. 8: 275, 276.

One nymph, East Point, Great I., 15/1/51, under Disphyma australe (A. Cunn.); at cliff-top (T.E.W.).

Occurs in the Oriental and Australian regions, including New Zealand.

FAMILY LYGAEIDAE. SUB-FAMILY LYGAEINAE.

Nysius huttoni Buch. White.

1878-Nysius huttoni Buch. White, Ent. mon. Mag. 15: 32.

Collected by author: 1 $\,$ $\,$ $\,$ $\,$ Tasman Valley, Great I., 12/1/51, sweeping sedges, grasses and rushes; 1 $\,$ $\,$ $\,$ $\,$ Great I., foot of cliff below depot,

14/1/51, on prostrate ngaio (*Myoporum laetum* Forst. f.); 2 & \$\delta\$, 2 & \$\mathbb{Q}\$, Great I., below cliffs near depot, 14/1/51, Chenopodium triandrum Forst.; 3 & \$\delta\$, 2 & \$\mathb{Q}\$, East Point, Great I., 15/1/51, under Disphyma australe (A. Cunn.) Black.

Collected by J. S. Edwards: 1 &, Quadrat II, Great I., 1/1/53, on puka (Meryta sinclairii (Hook.) Sum.; 1 &, cliff vegetation, Great I., 4/1/53, on flowering kanuka (Leptospermum ericoides); 3 & &, cliff edge above Castaway Valley, Great I., 4/1/53, dry grass.

Restricted to New Zealand.

Rhypodes clavicornis (Fab.).

1794-Lygaeus clavicornis Fabricius, Ent. Syst. 4: 169.

Collected by J. S. Edwards: 1 \(\varphi\), Tasman Valley, Great I., 31/12/52, sweeping from Leptospermum; 2 \(\delta\) \(\delta\), 1 \(\varphi\), cliffs below Tasman Valley, Great I., 31/12/52, swept from Haloragis erecta (Murr.) Schindler; 1 \(\delta\), 1 \(\varphi\), 1 nymph, cliffs at end Tasman Valley, Great I., 31/12/52, sweeping grasses and Scirpus; 1 \(\varphi\), Saddle, Great I., 2/1/53, tussock (Scirpus and Carex); 1 \(\delta\), cliff edge above Castaway Valley, Great I., 4/1/53, on Tetragonia.

The Great Island population of R. clavicornis differs from all specimens examined from a wide range of localities in both North and South Islands and smaller islands near the mainland coast, in the considerably longer rostrum. No other constant differences are apparent and I have not separated this form taxonomically, although in view of the wide use of rostral length as a systematic character in the Heteroptera, one might perhaps feel justified in regarding this form as a subspecies. However, it seems sufficient, at least at present, to draw attention to it as an example of early intraspecific divergence of a population in isolation. It is a geographic form distinguished by only one visible structure from the general population, and as such is perhaps best considered an incipient subspecies; with continued isolation it might be expected eventually to develop other correlated differences. The real interest of the form, whatever it be called, is as an example of evolution in progress. In most cases the difference in rostral length from that of mainland specimens is so considerable as to be immediately obvious, while there is no overlap in the ranges of relative rostral length in the material examined of the two populations. The proportionate rostral length of the S.W. Island material is intermediate between that

of the Three Kings and mainland specimens, and the range overlaps that of both. The ratio, length of rostrum: width of pronotum (across humeral angles) is as follows:—

	Mainland.	S.W. Island.	Great Island.
8	1.18-1.40	1.35-1.48	1.45-1.53
\$	1.07-1.32	1.30-1.41	1,40-1,49

In the Great I. specimens the rostrum reaches as far as the middle of to just beyond the posterior coxae, often reaching or extending on to the first visible abdominal sternum; segment I usually surpassing base of head, II surpassing fore coxae and extending on to mesosternum, III reaching middle or hind end of middle coxae. In the mainland specimens the rostrum usually reaches middle coxae, but does not extend as far as their middle, never reaching first visible abdominal sternum; segment I not or barely passing base of head, II not or barely passing fore coxae, III not or barely reaching middle coxae, not reaching to their middle. The positions given apply when, as is usually the case, the head is retracted to or near the maximum extent within the prothorax, so that the eyes touch the latter.

As Usinger (1942; pp. 42, 45-46) has pointed out, *Rhypodes clavicornis* varies considerably in the degree of development of the sublateral processes of the posterior pronotal margin; in some specimens they are well developed triangular projections, in others they are absent or scarcely discernible. Usinger found the absence of these lobes commoner in the South Island specimens. They are well developed in all the Three Kings specimens. An examination of mainland material has indicated a probable tendency to local geographic variation in respect of body colour and of size of the pronotal processes, but as yet insufficient material has been available to give a clear picture of the distribution of the forms involved and to determine whether any of them warrant taxonomic separation. This is a problem which should be considered together with the Three Kings material, and it is hoped later to continue these studies in greater detail, as they provide examples of the ways in which speciation might begin.

SUB-FAMILY RHYPAROCHROMINAE.

Targarema staali Buch. White.

1878-Targarema staali Buch. White, Ent. mon. Mag. 15 (1): 34.

Collected by author: $12 \ \delta \ \delta$, $13 \ Q \ Q$, Tasman Valley, Great I., 11-12/1/51, kanuka (*Leptospermum ericoides*); $1 \ \delta$, $1 \ Q$, Tasman Valley, Great I., sweeping sedges, grasses and rushes; $1 \ \delta$, $3 \ Q \ Q$, depot, Great I., 12/1/51, on *L. ericoides*; $2 \ Q \ Q$, Bald Hill, Great I., 12/1/51, sweeping grasses and rushes; $2 \ \delta \ \delta$, East Point, Great I., 14/1/51, under *Poa anceps* Forst. on cliff slopes; East Point, Great I., 15/1/51, $3 \ \delta \ \delta$, $2 \ Q \ Q$, on *L. ericoides*, $1 \ Q$ sweeping sedges and rushes.

Collected by J. S. Edwards: 6 & &, 4 & Q, Castaway Valley, Great I., 30/12/52, kanuka about camp site (L. ericoides); 7 & &, 3 & Q, Tasman Valley, Great I., 31/12/52, sweeping from Leptospermum; 1 &, 1 &, Eastern Arm, Great I., 1/1/53, sweepings from

ground vegetation (*Carex*, mosses, etc); 2 & &, kanuka canopy near Quadrat II, Great I., 2/1/53 (*L. ericoides*); 15 & &, 2 & Q, The Saddle, Great I., 2/1/53, *L. ericoides*; 1 &, near summit on N.W. cliffs, Great I., 3/1/53, kanuka canopy (*L. ericoides*); 1 &, 1 Q, cliff vegetation, Great I., 4/1/53, on flowering kanuka (*L. ericoides*); 1 &, 1 Q, Tasman Valley, Great I., 5/1/53, *Colensoa physaloides* (A. Cunn.) Hook.

Restricted to New Zealand.

Pachybrachius nigriceps (Dallas).

1852-Rhyparochromus nigriceps Dallas, Cat. Hem. Brit. Mus. 2: 577.

Collected by author: 6 & &, 9 & &, 17 nymphs, Tasman Valley, Great I., 11-12/1/51, sweeping grasses, sedges and rushes; 6 & &, 11 nymphs, Bald Hill, Great I., 12/1/51, sweeping grasses and rushes; 2 & &, East Point, Great I., 15/1/51, sweeping sedges and rushes.

Collected by J. S. Edwards: 2 nymphs, cliffs at end of Tasman Valley, Great I., 31/12/52, sweeping grasses and Scirpus; 1 &, Eastern Arm, Great I., 1/1/53, sweepings from ground vegetation (Carex, mosses, etc.); 8 nymphs, N.W. cliffs, Great I., 4/1/53, sweeping Carex and Scirpus; 1 &, 1 nymph, Bare Saddle, S.E. Bay, Great I., 5/1/53, low manuka (Leptospermum scoparium); 1 &, The Saddle, Great I., 2/1/53, tussock (Scirpus and Carex); 38 & &, 42 & Q, 20 nymphs, cliff brow, S.W. Cove, Great I., 5/1/53, on Scirpus nodosus Rottb.

Widespread in the Pacific area, including New Zealand.

Taphropeltus putoni (Buch. White).

1878-Scolopostethus putoni Buch. White, Ent. mon. Mag. 15: 75.

1 $\,$ $\,$ $\,$ Tasman Valley, Great I., 11/1/51, sweeping sedges, grasses, and rushes (T.E.W.).

Known only from New Zealand.

Tomocoris insularis Woodward.

1953-Tomocoris insularis Woodward, Rec. Cant. Mus. 6 (3): 213.

1 9, Castaway Valley, Great I., 15/1/51, ex leaf mould under sedges beside stream (T.E.W.).

Known only from the Three Kings.

SUB-FAMILY CYMINAE.

Genus CYMUS Hahn, 1832.

Cymus novaezelandiae sp. nov., figs.1-2.

This species occurs in two forms, macropterous and sub-brachypterous, of which the latter appears to be by far the more common.

Diagnosis: Colour brown; stramineous or ochreous, sometimes infuscated or ferruginous. Second antennal segment short, subequal in length to first and about 2/5th as long as third; fourth segment and

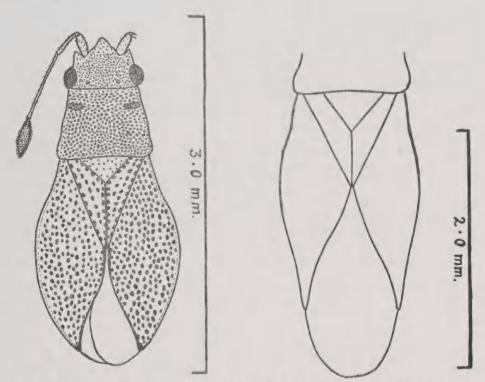
dilated apex of third black; fourth segment very strongly swollen, in middle about \frac{1}{3} as wide as long and rather thicker than first segment. about ² as long as third segment. Head rather wider across eyes than long. Under-surface of head and thorax with golden, deciduous, scalelike hairs. Bucculae half or very nearly half as long as first rostral segment, which does not quite reach base of head. Pronotum rather longer than head and $\frac{2}{3}$ as long as wide at basal angles, length equal to anterior width. Pronotum raised between calli but with median carina obsolete; scutellum convexly raised behind the depressed base, Metathoracic scent-gland spouts very small, without true carina. ventrally truncate. Costal margins of coria strongly convex, sinuately incurved at about 1/5th from base, whence nearly straightly converging to base; in macropterous, but not in sub-brachypterous form, also sinuately incurved towards apex. In sub-brachypterous form, membrane short and narrow, 2 as long as and narrower than corium, and extending for only about \(\frac{1}{8} \) of its length beyond apex of coria; in macropterous form, slightly to considerably wider than corium and $\frac{3}{4}$ or more as long, extending for \(\frac{1}{4}\) or more of its length beyond apex of coria. Length: sub-brachypterous 2.4-3.2 mm.; macropterous about 3.5 mm. Width: sub-brachypterous 1.0-1.3 mm.; macropterous (two specimens). \$ 1.15 mm.: 9 1.4 mm.

Sub-brachypterous form, fig. 1.

Colour: Ochreous; head ferruginous, usually darker; eyes brownish black; ocelli reddish; antennae with fourth segment and usually extreme apex of third black; fourth rostral segment, the claws and the apex of third segment of tarsi black; venter of thorax black in middle between coxae, the rest ochreous to dark brown; pronotum and scutellum ochreous, usually darker than hemelytra and more or less infuscated; calli brown; hemelytra pale stramineous to ochreous, sometimes more or less infuscated in streaks and around punctures; inner margin of corium, bordering membrane, narrowly infuscated, more conspicuously black at base behind apex of clavus and at apex; whole dorsal suface occasionally with reddish tinge; membrane colourless and transparent towards apex, infuscated towards base; venter of abdomen ochreous or ferruginous, sometimes nearly black towards base.

Head: From above about $\frac{1}{3}$ as wide again across eyes as long (52:38). Each eye about $\frac{1}{4}$ as wide as interocular space (9:34); distance between ocelli twice that between each ocellus and the level of the innermost margin of the eye (taken transversely) (15:7). Head above with close punctation, giving a granularly roughened appearance, punctures more remote on tylus and antenniferous tubercles; below finely and more remotely punctate; above and below with a covering of deciduous, golden, scale-like hairs, most of those of upper surface usually rubbed off, those of under surface usually concealing the punctures.

Antennae $1/6^{th}-\frac{1}{4}$ as long again as head and pronotum together; segment I short, stout, equal or subequal in length to distance between ocelli, subcylindrical, narrowing slightly towards apex; segment II short, equal or subequal in length to I and only $\frac{1}{3}-\frac{3}{8}$ as long as III, slightly and gradually thickened on apical half; III the longest and most slender, swollen at extreme apex; IV fusiform, subacute apically,



Figs. 1-2. Cymus novaczelandiae sp. nov. 1. sub-brachypterous &; 2, macropterous &, outline to show form of hemelytra.

strongly swollen, width near middle about \$\frac{1}{3}\$ length and rather wider than I; relative length of segments I-IV, 15: 15: 42: 30 (III and IV may vary even between the antennae of the one individual); relative width, I 7; II 2.5 at base, 4 at apex; III 3 at base, 4.5 at apex; IV 9.5 in middle; all segments with minute, setiferous tubercles, the hairs of segments I-III very short, pale, inconspicuous, semi-recumbent, rather sparse; IV with a close covering of very much longer black hairs. Rostrum reaching to posterior end of middle coxae, sometimes as far as anterior margin of hind coxae; segment I not quite reaching base of head; II reaching or almost reaching front coxae; III passing front coxae but not reaching middle coxae; segment I the longest, then in order, IV, II, III, but II sometimes equal to III, and sometimes nearly as long as IV; relative length of segments I-IV, 24: 16: 16: 21. Bucculae half as long as first rostral segment or nearly so, pale ochreous, with three or four punctures.

Thorax: Pronotum trapeziform; anterior and posterior margin nearly straight, the latter very broadly and shallowly emarginate; sides nearly straight, very feebly sinuate; rather longer than head (43: 38) and 1/6th-¼ as wide again across posterior angles as head across eyes (62: 52); median length $\frac{2}{3}$ -¾ posterior width (43: 62) and equal to or only slightly greater than anterior width; anterior collar ¼ as long as whole pronotum, demarcated laterally, in front of calli, by more or less distinct transverse impressions; central part of disc, between calli, rather convexly raised but only obsoletely carinate; posterior half of disc scarcely raised, nearly flat, not markedly declivous at basal margin;

whole surface of pronotum, except the well defined calli, with large punctures mostly less than one puncture-width apart. Under-side of all thoracic segments, to bases of legs, similarly though rather more obscurely punctate, with a covering of deciduous hairs similar to those of the head (pronotum apparently originally with similar hairs, one to each puncture, but these have been worn down to their extreme bases, except where protected in the depressions between anterior collar and calli). Median part of thoracic venter, between bases of legs, with fine punctures several puncture-widths apart. Metathoracic scent-gland spout very small, tubercle-like, ventrally truncate. Scutellum with fine. rather obscure punctures, disc convexly raised towards median line, but without a distinct carina; base strongly depressed; 13/4 to twice as wide at base as long (31: 17). Legs short, with a covering of very short, pale, inconspicuous hairs, longest on hind tibiae and tarsi; relative length, femur: tibia: tarsus (excluding claws), as 32: 33: 18 (front leg); 50: 47: 20 (hind leg).

Hemelytra: Costal margins of corium strongly and evenly convex until about 1/5th from base, where sinuately incurved, thence nearly straightly converging to base; costal border above only narrowly flattened; corium twice to 2½ times as long as outer margin and 3-4 times inner margin (behind scutellum) of clavus (116: 55: 35). Clavus with three rows of deep punctures larger than those of pronotum, those of each row nearly contiguous: a row closely parallel to claval suture, a V-shaped row parallelling the inner and the scutellar margins, and a straight row between them; in addition, usually one or two punctures between the two last-mentioned rows near the inner end; whole of corium covered with similar punctures. Membranes relatively short and narrow, each about ½ as long as corium (75: 116) and with greatest width less than (0.55-0.88) greatest width of corium (25:40); extending beyond apex of coria for only 1/10th-1/6th of their own length (12: 75) and for a distance equal to only 1/17th-1/9th of the corium length.

Abdomen with venter very finely pubescent at base, except at sides, remainder shining, nearly glabrous, with extremely short, sparse, pale hairs.

The actual measurements are those of the holotype &; the ranges of proportions are from the whole available series of both sexes. There are no constant sexual differences in any of the proportionate dimensions, except as detailed below.

Length: \$ 2.4 mm.-2.7 mm.; \$ 2.9 mm-3.2 mm. Width: \$ 1.0 mm.-1.13 mm.; \$ 1.20 mm.-1.27 mm. Ratio of length to width: \$ 2.2-2.5; \$ 2.4-2.5.

Macropterous form, fig. 2.

This differs from the sub-brachypterous in the following respects: Hemelytra longer, with costal margin of corium sinuately incurved at apex as well as base. Membrane much longer and wider, in the two specimens to hand 0.84 (δ) and 0.75 (φ) times as long as corium; wider than corium (δ 60: 42; φ 54: 50); extending beyond apex of corium for about $\frac{1}{3}$ of its own length in δ (43: 112) and about $\frac{1}{4}$ in

 \circ (31: 112) and for nearly $\frac{1}{3}$ of corium length in δ (43: 133) and about $1/5^{\text{th}}$ in \circ (31: 150). Pronotum proportionately rather larger, about $\frac{1}{4}$ as long again as head (51: 41 in δ , 50: 44 in \circ). Size greater and form more elongate. Length: δ , \circ 3.5 mm. Width: δ 1.15 mm.; \circ 1.4 mm. Ratio of length to width: δ 3.0; \circ 2.5.

Both these macropterous specimens are dark; the pronotum, clavi and coria similarly infuscated ochreous; calli brownish black in δ ; venter of abdomen ferruginous, infuscated on basal half, where nearly black in δ .

Sub-brachypterous form:

Types: Holotype &, Paiaka, Manawatu, North I., 9/1/50, T.E.W. Allotype &, Otautu area, Cape Colville, Coromandel Pen., North I., 16/1/52, sweeping grasses, T.E.W. In Auckland Museum.

Other specimens examined (including paratypes). Mainland and nearby islands: 1 &, 1 \, Kaitaia, N. Auckland, N.I., 13/5/23, J. G. Myers (Dom. Mus.); 2 &, 2 \, Auckland, 20/3/49, T.E.W.; 1 \, Auckland, 8/49, T.E.W.; 1 \, Paiaka, Manawatu, 2/2/51, T.E.W.; 1 \, Kawau I., Auckland, 5/1/51, T.E.W.

Three Kings Is.: 18, N.W. cliffs, Great I., 4/1/53, sweeping Carex and Scirpus, J. S. Edwards; 18, cliff brow, S.W. Cove, Great I., 5/1/53, on Scirpus nodosus, J. S. Edwards.

Macropterous form:

One 9, Dyer's Pass, Christchurch, S.I., 9/1/25, C. E. Clarke, coll (Auck. Mus.); 1 &, Remuera, Auckland, 1/2/52, E. T. Giles.

This is in all probability the species referred to by Myers (1926; pp. 457, 462, 485) as Cymodema sp., of which he notes: "Adults have been taken in August, December, and February in the sweeping-net, and in May and July in winter quarters at the bases of rush-clumps, where they were most abundant in the later month." Of host plants, he says, "Meadow-grasses, especially Bromus unioloides K.B.K., are favoured. In winter the bases of Juncus effusus L. afford them shelter." He records the species as having been collected in North Auckland (Kaitaia), Wanganui, Levin (Weraroa), and Waikanae, all in the North Island.

Abnormalities:

In one Q (Otautu) the punctation of the right clavus is much reduced. The inner row has only 5 punctures behind scutellar apex (instead of about 8) and 2 near base; the outer row has only 2 punctures in apical half and 3 near base. The middle row is lacking. The basal half of the clavus is thus impunctate except at the extreme base. Those punctures present are of normal form. The punctation of the left clavus is normal.

Two specimens show antennal oligomery, a common malformation in the Lygaeidae. In 1 $\stackrel{\circ}{\circ}$ (Auckland, 8/49), the left antenna shows no division between segments III and IV, and the resultant fused segment is considerably shortened (ratio to III + IV on right antenna,

40:64) and apically dilated as a black club, smaller and blunter at base and apex than the normal segment IV. The appearance is of regeneration following loss of the two apical segments in a nymphal instar. In 1 \(\) (Kaitaia), the left antenna shows no obvious segmentation after segment I and the unsegmented region is shortened as in the \(\frac{3}{3} \) (ratio to II + III + IV of right antenna, 56:87). There is also a curious malformation of the unsegmented region, which is clavately swollen and black at about half-way, then twisted, the apical half coming off from one side of the club, and narrowed; at the extreme apex the antenna is swollen again as an ovoid, stouter, and much shorter black club. The impression given is of an initial break at the extreme base of segment II of the nymphal antenna, followed by a second, apical break and/or damage after the regeneration of the first club.

(All the proportionate measurements given for the species are to the scale 75 units = 1 mm.)

Dr. W. E. China has determined the present species as belonging to *Cymus*. The short second antennal segment, subequal to the first, is not usual in the genus, but there is another instance in the North American species *Cymus breviceps* Stal.

FAMILY REDUVIDAE. SUB-FAMILY EMESINAE.

Empicoris rubromaculatus (Blackburn).

1889—Ploiariodes rubromaculatus Blackburn, Proc. Linn. Soc. N.S.W. 3 (1): 349.

One &, 1 &, Tasman Valley, Great I., 31/12/52, sweeping from Leptospermum, J. S. Edwards.

A widely distributed species, occurring in the Americas, the Pacific, Australia and New Zealand.

FAMILY NABIDAE.

Nabis maoricus F. Walker.

1873-Nabis maoricus F. Walker, Cat. Hem. Het. Brit. Mus. 7: 145.

1878-Nabis saundersi Buch. White, Ent. mon. Mag. 15: 159.

The Saddle, Great I., 2/1/53, 1 \(\rightarrow \) on kanuka (Leptospermum cricoides), 1 \(\rightarrow \) on ngaio (Myoporum laetum), J. S. Edwards. 1 \(\rightarrow \), E. block, Great I., 15/1/51, T. E. Woodward.

Endemic to New Zealand, where common and widespread. Dr. W. E. China has compared New Zealand specimens of both this species and the following with material in the British Museum, and gives the above new synonymy as probably correct. Previously, N. saundersi has been synonymised by some authors with N. capsiformis.

Nabis capsiformis Germar.

1837-Nabis capsiformis German, Silbermann Rev. Ent. 5: 132.

One &, 2 nymphs, Castaway Valley, Great I., 12/1/51, T. E. Woodward.

This species is widespread in the Pacific and is now nearly cosmo-

FAMILY ANTHOCORIDAE.

Specimens of apparently a single species of Anthocorid were taken by J. S. Edwards and the author from Great I. (on Chenopodium triandrum and Leptospermum and from leaf mould, and by the author from S.W. Island (sweeping Myoporum lactum and Muehlenbeckia complexa). As the Anthocoridae of the Australian region are in process of revision by Mr. G. F. Gross, of the South Australian Museum, specimens have been forwarded to him, and it has seemed desirable to await his determination on the basis of this wider study.

Mr. Gross has identified these specimens as belonging to a new species of *Lasiochilus* Reuter, which he is describing, and which is also widespread on the mainland of New Zealand.

FAMILY ARADIDAE.

A single specimen was extracted from leaf mould collected by the author under ngaio (*Myoporum laetum*) on S.W. Island, 13/1/51. Together with other New Zealand material, this has been forwarded to Prof. R. L. Usinger, of the University of California, who is engaged in a revision of the Aradidae of the world.

FAMILY MIRIDAE. SUB-FAMILY MIRINAE.

Megaloceroea reuteriana Buch. White.

1878-Megaloceroca (Megaloceroca) renteriana Buch. White, Ent. mon. Mag. 15: 130.

This species is widespread in Australia and New Zealand and is common on grasses, sedges and rushes.

Calocoris laticinctus (Walker).

1873-Capsus laticinctus F. Walker, Cat. Hem.-Het. Brit. Mus. 6: 128.

Tasman Valley, Great I.; 2 & &, 1 \, 11/1/51, sweeping Blechnum; 1 &, 1 \, 2, 12/1/51, sweeping grasses and sedges, T.E.W.

This species, which has long been synonymised with Capsus ustulatus F. Walker, loc. cit., was placed by Distant in the genus Calocoris, but, as Dr. China has pointed out (in litt.), it differs from other species of Calocoris in having the head completely transversely carinate behind. Eventually it will most probably have to be removed from this genus. The species is known only from New Zealand.

Eurystylus australis Poppius.

1911-Eurystylus australis Poppius, Ofvers. Finsk. Vet. Soc. 53 A (4): 15.

One 2, cliffs below Tasman Valley, Great I., 31/12/52, swept from *Haloragis erecta* (Murr.) Schind.; coll. J. S. Edwards.

This species occurs in both Australia and New Zealand, having apparently been introduced from the former to the latter.

Genus LYGUS Hahn, 1833.

Three species of Lygus were taken, but as this genus is a very large and cosmopolitan one, and most of the New Zealand and Australasian species are either undescribed or inadequately described, the naming of isolated new species is highly undesirable. The Lygus fauna of these regions needs revision as a whole and the author hopes to attempt this before long.

- Sp. 1. Numerous specimens (several hundred) were collected by J. S. Edwards and the author from Leptospermum ericoides (kanuka) on Great I. The same species is also extremely abundant on kanuka on the mainland of New Zealand.
- Sp. 2. Specimens were collected by J. S. Edwards and the author from Myoporum laetum (ngaio) on Great I. This species also occurs on the mainland.
- Sp. 3. Taken by the author from shrubs on both Great I. and S.W. Island. Not known from the mainland.

SUB-FAMILY ORTHOTYLINAE (CYLLECORINAE). Coridromius variegatus (Montrouzier).

1861-Ocypus variegatus Montrouzier, Ann. Soc. ent. Fr. (sér. 4) 1: 67.

Eight & &, 9 & &, 21 nymphs, S.W. Island, 13/1/51, on and under Salicornia australis Forst.; 14 & &, 17 & &, 28 nymphs, East Point, Great I., 14/1/51, Chenopodium triandrum Forst., on rocks at foot of cliffs; 1 &, 3 & &, near depot below cliffs, Great I., Chenopodium triandrum; coll. T. E. Woodward.

This species was kindly determined by Dr. W. E. China, British Museum (Nat. Hist.). This is the first record of the species from New Zealand, and I have subsequently taken it from the Wellington district, North I. (1/2/51, Day's Bay, on Lepidium oleraceum Forst., and Titahi Bay, on and beneath Salicornia australis, Lepidium oleraceum and Chenopodium triandrum). All the plants on which it has been found in New Zealand are coastal succulents. This small, mottled

species occurs also in Australia and New Caledonia. The hind femora are incrassate and the insect is capable of jumping some distance into the air when disturbed.

SUB-FAMILY PHYLINAE (PLAGIOGNATHINAE).

Sthenarus myersi Woodward.

1950—Sthenarus myersi Woodward, Rec. Auck. Inst. Mus. 4 (1); 22-23; figs. 12-15.

Collected by author: 22 & & , 18 \circ \circ , 2 nymphs, Tasman Valley, Great I., 11-12/1/51; 2 \circ \circ , 1 nymph, near depot, Great I., 12/1/51; 3 & & , 7 \circ \circ , 2 nymphs, East Point, Great I., 15/1/51:

Collected by J. S. Edwards: 1 $\,^{\circ}$, near depot, Great I., 30/12/52; 1 $\,^{\circ}$, Tasman Valley, Great I., 31/12/52; 1 $\,^{\circ}$, on cliffs, Great I., 4/1/53; 1 $\,^{\circ}$, Bare Saddle, S.E. Bay, Great I., 5/1/53.

All the specimens were collected on kanuka (Leptospermum ericoides A. Rich.).

This species is known only from New Zealand, where it has a wide range at least in the North Island.

With the larger series now available, additional information can be given on variations in colour. The males tend to be darker than the females, but both sexes may be more or less rufescent, either above or both above and below, the cuneus sometimes entirely red or reddish brown, and some males, though in smaller proportion than the females, have the basal two-thirds of the second antennal segment ochreous. All specimens are of the larger type, as described by the author (1950) from Manawatu.

Sthenarus sp.

This species, which so far as can be determined at present is new, and is not known to the author from the mainland, was taken on pohutukawa (Metrosideros excelsa Gaertn.), 12-15/1/51 (T.E.W.). Unfortunately, the specimens are damaged, and description has been deferred until a better series can be obtained.

FAMILY VELIIDAE. SUB-FAMILY MICROVELIINAE.

Microvelia halei Esaki.

1926—Microvelia oceanica Hale, Rec. S. Austr. Mus. 3: 208; nec Distant 1914, in Sarasin and Roux, Nova Caledonia, Zool. 1: 383.

1928—Microvelia halei Esaki, Ins. of Samoa 2 (3): 69; new name for M. oceanica Hale.

Thirty-six apterous δ δ , 33 apterous 9, 1 macropterous 9, 40 nymphs, Tasman Stream, Great I., 11/1/51, T.E.W.

Occurs in Australia, New Zealand, and Lord Howe I.

REFERENCES.

- BATTEY, M. H., 1951. Notes to Accompany a Topographical Map and a Provisional Geological Map of Great Island, Three Kings Group. Rec. Auck. Inst. Mus. 4 (2), 93-97, pls. 8-9.
- BAYLIS, G. T. S., 1948. Vegetation of Great Island, Three Kings Group. Rec. Auck. Inst. Mus. 3 (4 and 5), 239-252.
- MYERS, J. G., 1926. Biological Notes on New Zealand Heteroptera. Trans. N.Z. Inst. 56, 449-511.
- MYERS, J. G., and CHINA, W. E., 1928. A list of New Zealand Heteroptera with the description of a remarkable green Aradid representing a New Genus. Ann. Mag. Nat. Hist. (10) 1, 377-394.
- SPILLER, D., and TURBOTT, E. G., 1944. The occurrence of some Australian Insects and a Spider in New Zealand. Rec. Auck. Inst. Mus. 3 (1), 79-83.
- TURBOTT, E. G., 1948. Effect of Goats on Great Island, Three Kings, with descriptions of Vegetation Quadrats. Rec. Auck. Inst. Mus. 3 (4 and 5), 253-272.
- USINGER, R. L., 1942. The Orsillini of New Zealand. Trans. R. Soc. N.Z. 72 (1), 41-52.
- WOODWARD, T. E., 1953a. The Heteroptera of New Zealand. Part I—Introduction; Cydnidae; Pentatomidae. Trans. R. Soc. N.Z. 80 (3 and 4), 299-321.
- WOODWARD, T. E., 1953b. New Genera and Species of Rhyparochrominae from New Zealand (Heteroptera; Lygaeidae). Rec. Cant. Mus. 6 (3): 191-218.